

Sounding Board

Participation in work: The necessity of addressing executive function deficits

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1. Introduction

Participation is a broad construct that occupational therapy uses to describe the satisfactory engagement in a client's chosen occupations and roles in home, work, and community environments [5]. Participation is so central to the practice of occupational therapy that it is one of the three overarching concepts that is used to describe the outcomes of occupational therapy services in the OT Practice Framework-2nd Edition [2]. Working with clients to help them to participate in their chosen occupations and roles is a complex process and the argument can be made that helping them to engage in their role as a worker is the most complex. The complexity of all the interrelated factors associated with work including the clients goals and expectations, the constraints of rehabilitation service delivery systems, and the dynamic nature of work, all contribute to the difficulty of helping someone with a disability reintegrate back into the workforce [25]. While the rehabilitation community is aware that this is a complex process, the problem remains that overall rehabilitation professionals have not been successful in helping individuals with disabilities return to work. The 2004 U.S. census data shows that 44% of people with a non-severe disability work full time year-round and 13% percent with a severe disability work full time year-round [32]. This is a trend that has not changed over time. In 1995,

research showed that despite best rehabilitation efforts the majority of Americans with disabilities were not working and this number has been constant since at least 1986 [25]. The majority of Americans with disabilities are not working even with legislation in place to protect their right to work and in spite of the fact that an overwhelming majority of individuals with disabilities have a desire to work [4]. It is time occupational therapy to embrace the fact that there is a lot of opportunity to expand our ability to help individuals with disabilities to reintegrate back into the workforce. To support our clients in fulfilling their work related goals, occupational therapists must have a comprehensive toolbox of knowledge, skills, and measures that will be able to address the complexity of work rehabilitation. Just like other areas of practice, this toolbox must address the broad range of internal, external, and occupational factors that underlie performance and participation. This article will review executive function, one area that is extremely underrepresented in the occupational therapist's toolbox.

1.1. Executive function

It is difficult to define the term "executive function" because across disciplines, areas of research, and clinical settings executive function has a different definition and the term often times leads to a great deal of

miscommunication. Given that the International Classification of Functioning, Disability and Health (ICF) model was developed to “establish a common language for describing health and health-related states in order to improve communication between health care workers, researchers, policy-makers and the public, including people with disabilities (pg. 5),” [36] the ICF definition is used for the purposes of this paper. The ICF developed the term “higher-level cognitive functions” in lieu of executive functions and defines it as follows:

Specific mental functions especially dependent on the frontal lobes of the brain, including complex goal-directed behaviors such as decision-making, abstract thinking, planning and carrying out plans, mental flexibility, and deciding which behaviors are appropriate under what circumstances; often called executive functions [36, p. 57].

It is apparent from this definition that executive functions are central to the ability of a person to synthesize information from several areas of the brain and to generate, implement, and correct strategies necessary to accomplish novel tasks in everyday life—particularly those tasks seen in a complex work environment [13, 17]. While the frontal lobes of the brain by the definition of executive functions are known to be an integration center, executive functions rely on connections to other areas throughout the brain. For this reason, individuals can experience executive dysfunction even in absence of frontal lobe injury [17,31]. Therefore, almost any diagnosis that affects the brain can potentially effect to a greater or lesser extent executive functioning. Further, the fact that executive functions often present in novel situations can create major difficulty in the ability of the therapist to assess and detect executive dysfunction. Typical assessments are structured, in an area free of distractions, and the therapist typically provides rules, goals, and prompts to elicit specific behaviors [17]. Therefore the assessment is not allowing the participant to actually use their executive functions to accomplish the task. This is apparent in the fact that while many clients report and demonstrate problems with executive functioning in everyday life many do not show this same level of impairment on structured testing specifically focused on executive function [10,17,27]. The link between impaired executive functioning and disruption in everyday life, even when other cognitive functions are relatively unaffected, is well-established [27] Therefore, the identification of impaired executive functions is crucial given that this construct is so central to independent living. The varying definitions of executive function, the difficulty

in assessment, and the number of people with executive dysfunction that go undetected with current assessment methods make it hard to quantify exactly how many people have difficulty with everyday life activities due to executive dysfunction following injury or illness; however, the numbers are actually more overwhelming imaginable.

2. Scope of the problem

While previous research described above has alluded to the fact that executive dysfunction can be linked to almost any diagnosis that affects the brain, there has been documented research that has proven executive dysfunction can occur from many of the common diagnoses occupational therapists encounter every day. Executive function impairment has been documented in but not limited to the following populations: head injury [14], stroke [6], Alzheimer’s disease, spinal cord injury [15], Parkinson disease [8,16], psychiatric disorders [12,23], autism [24], multiple sclerosis [7], and cancer [19]. When considered collectively, this represents an astronomical amount of individuals and this list is not exhaustive. To demonstrate the vastness of this issue, executive dysfunction in the stroke population, just one of the populations listed above, will be described.

According to the American Heart Association, 780,000 people have a stroke each year in the United States and is the most cited reason for serious and long-term disability [3]. Each year, the estimated direct and indirect cost of stroke is 65.5 billion dollars [3]. The leading driver of the indirect costs of stroke is lack of productivity-or inability to work following a stroke. Up to 44% of the indirect cost of stroke has been attributed to lost earnings [28]. Recent evidence shows that almost 50% of people having strokes are working age and have a neurologically mild stroke [33]. These individuals are typically independent in self-care, have no motor impairment, are fluent in speech, and therefore are typically discharged with little to no rehabilitation services [33]. The assumption long has been that since these individuals, who represent the largest group of stroke survivors, have no outward signs of impairment they will be able to return to their pre-stroke roles including work. However, of the individuals in this group who were working at the time of their stroke, close to 40% never return to work and another 15% are unemployed six months later [20]. What is the reason this is happening? The literature has established

that in absence of motor impairment following mild stroke, more subtle deficits including depression, impaired attention, and impaired executive function have been suggested to be the cause [9]. This description of the problem from stroke population demonstrates the vastness of the problem and sets up some major issues that occupational therapy must address.

3. Implications for occupational therapy

3.1. Assessment

As it was highlighted above, the traditional assessments of executive function have been shown to be more or less effective in being able to: (1) detect executive function deficits; and (2) be able to predict if executive function deficits will effect participation. The gold standard for executive function assessment is currently neuropsychological assessment. The problem is that traditional neuropsychological assessments tasks are usually short in duration, well-structured, and have clearly defined goals and outcomes, all which contradict defined components of executive function [1, 35]. For this reason, assessments known as ecologically valid assessments, which means that the test is representative of real-world performance, have been developed and are used in conjunction with neuropsychological assessment [26,34]. In the context of work-rehabilitation, this form of assessment is of great importance because this form of assessment is more sensitive to identifying how executive function deficits will impact the client's ability to perform complex work-related activities. The problem is that there are very few ecologically valid executive function assessments available and extremely few that are focused on work performance. One example of an ecologically valid assessment for executive function that was developed specifically to assess work performance is the Complex Task Performance Assessment (CTPA). The CTPA was developed to be an assessment that was more sensitive to executive dysfunction than current neuropsychological testing and more work-oriented than current ecologically valid measures of executive dysfunction [35]. The problem is that besides the CTPA, there are no other known ecologically valid assessments of executive dysfunction that were designed specifically evaluate work performance and the CTPA is still in development. The occupational therapy community has to continue to develop assessments of this nature to identify executive function deficits and work to integrate them into current rehabilitation models to detect individuals who have these deficits before they return to work and fail.

3.2. Intervention

Currently, there are established frame of references for occupational therapy intervention specifically geared toward helping individuals overcome executive dysfunction. The problem is that they have not been tested and are not being used in a work rehabilitation context. The Dynamic Interactional Model of Cognition and the Cognitive Orientation to Daily Occupational Performance Model are examples of these frames of reference and are described below. Both frames of references, while theoretically sound, are not being used extensively in work rehabilitation to address executive dysfunction; however, need to be evaluated for this purpose.

3.2.1. *Dynamic interactional model of cognition*

The DIM approach is focused on grading the task demands and the environment in combination with a cueing structure in order to help develop compensation strategies for executive dysfunction. This treatment approach can also help individuals develop strategies to increase awareness of how deficits will require a change to work demands and modification of the work environment. The DIM approach is based on well-established literature of how people process, learn and generalize information [29,30]. Within this model, cognition is viewed as a product of the dynamic interaction between the person, the occupation, and the environment. Cognition is considered modifiable in certain situations in order to meet the demands of the task. DIM is based on the premise that people's ability to process information is limited and there are different ways that capacity can be used. The efficient allocation of processing resources is key to learning and cognition [11]. This approach fits well into work rehabilitation theory which focuses on presenting the client with differing activity demands and different environments.

3.2.2. *Cognitive orientation to daily occupational performance (CO-OP)*

CO-OP is a performance-based problem solving framework that focuses on developing skills through the use of strategies [21,22]. CO-OP uses reinforcement, modeling, shaping, prompting, fading and chaining intervention strategies to support skill acquisition [21]. CO-OP also builds on a definition of learning as an active process of acquiring, encoding and using information to perform an activity. The problem solving strategy used in CO-OP is "GOAL, PLAN, DO, CHECK" was adopted from Meichenbaum as a general strategy

for guiding the discovery of task specific strategies to support skill development [18]. The process begins with setting a goal and then general problem solving strategy is used to help the client identify the task specific strategies that can be used to overcome the breakdown and perform the task. CO-OP, while not extensively tested with adults or a work rehabilitation setting, would also work well in work rehabilitation context; however, it needs to be tested in this area first.

4. Conclusion

The occupational therapy community could improve in their effectiveness of helping individuals with disabilities return to work. One of the primary limiting factors for decreased participation in work following injury or illness is executive dysfunction. While the role of executive function in accomplishing complex everyday life activities is well known, occupational therapy has done limited work in developing effective assessments and interventions to help individuals with executive dysfunction return to work. This is a key area of occupational therapy to address and much work has to be done in this area in order to increase participation of individuals with disabilities in work.

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